

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

CHAS.HUDE A/S
H.C. Andersens Boulevard 33
DK-1780 Copenhagen V
DANEMARK

Date of mailing (day/month/year) 05 October 2000 (05.10.00)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference SI/OL. 71723	
International application No. PCT/DK99/00631	International filing date (day/month/year) 17 November 1999 (17.11.99)

1. The following indications appeared on record concerning:

☐ the applicant ☐ the inventor ☒ the agent ☐ the common representative

Name and Address CHAS.HUDE A/S H.C. Andersens Boulevard 33 DK-1553 Copenhagen V Denmark	State of Nationality	State of Residence
	Telephone No. +45 33 15 45 14	
	Facsimile No. +45 33 15 45 35	
	Teleprinter No.	

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☐ the person ☐ the name ☒ the address ☐ the nationality ☐ the residence

Name and Address CHAS.HUDE A/S H.C. Andersens Boulevard 33 DK-1780 Copenhagen V Denmark	State of Nationality	State of Residence
	Telephone No. +45 33 15 45 14	
	Facsimile No. +45 33 15 45 35	
	Teleprinter No.	

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

<input checked="" type="checkbox"/> the receiving Office	<input type="checkbox"/> the designated Offices concerned
<input type="checkbox"/> the International Searching Authority	<input checked="" type="checkbox"/> the elected Offices concerned
<input checked="" type="checkbox"/> the International Preliminary Examining Authority	<input type="checkbox"/> other:

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Sean Taylor Telephone No.: (41-22) 338.83.38
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PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents
United States Patent and Trademark
Office
Box PCT
Washington, D.C. 20231
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 02 August 2000 (02.08.00)	
International application No. PCT/DK99/00631	Applicant's or agent's file reference SI/OL. 71723
International filing date (day/month/year) 17 November 1999 (17.11.99)	Priority date (day/month/year) 17 November 1998 (17.11.98)
Applicant PRIMDAHL, Søren et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:

02 June 2000 (02.06.00)

☐ in a notice effecting later election filed with the International Bureau on:2. The election ☒ was☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Claudio Borton Telephone No.: (41-22) 338.83.38
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1

INTERNATIONAL SEARCH REPORT

International application No.
PCT/DK 99/00631

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H01M 4/86, H01M 8/12
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: H01M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 5190183 (NGK INSULATORS LTD) 9 November 1993 (abstract).(online)(retrieved on 2000-02-18). Retrieved from: EPO PAJ Database --	1-3
A	US 3496021 A (J.F. HAEFLING), 17 February 1970 (17.02.70), column 1, line 70 - column 2, line 28 -- -----	1-3

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

- * "A" document defining the general state of the art which is not considered to be of particular relevance
- * "E" earlier document but published on or after the international filing date
- * "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- * "O" document referring to an oral disclosure, use, exhibition or other means
- * "P" document published prior to the international filing date but later than the priority date claimed

* "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

* "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

* "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

* "&" document member of the same patent family

Date of the actual completion of the international search

18 February 2000

Name and mailing address of the ISA/
Swedish Patent Office
Box 5055, S-102 42 STOCKHOLM
Facsimile No. +46 8 666 02 86

Date of mailing of the international search report

02-03-2000

Authorized officer

Ulla Granlund/ELY
Telephone No. +46 8 782 25 00

The demand must be filed directly with the competent International Preliminary Examining Authority or, if two or more Authorities are competent, with the one chosen by the applicant. The full name or two-letter code of that Authority may be indicated by the applicant on the line below:

IPEA/ EP

PCT

CHAPTER II

DEMAND

under Article 31 of the Patent Cooperation Treaty:
The undersigned requests that the international application specified below be the subject of international preliminary examination according to the Patent Cooperation Treaty and hereby elects all eligible States (except where otherwise indicated).

For International Preliminary Examining Authority use only

Identification of IPEA		Date of receipt of DEMAND
Box No. I IDENTIFICATION OF THE INTERNATIONAL APPLICATION		Applicant's or agent's file reference 71723 Si/TK
International application No. PCT/DK99/00631	International filing date (day/month/year) 17 November 1999 (17.11.1999)	(Earliest) Priority date (day/month/year) 17 November 1998 (17.11.1998)
Title of invention Electrochemical Cell		
Box No. II APPLICANT(S)		
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) FORSKNINGSCENTER, RISØ 399, Frederiksborgvej DK-4000 Roskilde Denmark		Telephone No.: +45 46 77 46 46 Facsimile No.: +45 46 77 40 33 Teleprinter No.:
State (that is, country) of nationality: Denmark	State (that is, country) of residence: Denmark	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) PRIMDAHL, Søren 2, Skovkrogen DK-3400 Allerød Denmark		
State (that is, country) of nationality: Denmark	State (that is, country) of residence: Denmark	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) BAGGER, Carsten 7, Toftager, St. Valby DK-4000 Roskilde Denmark		
State (that is, country) of nationality: Denmark	State (that is, country) of residence: Denmark	
<input checked="" type="checkbox"/> Further applicants are indicated on a continuation sheet.		

Continuation of Box No. II APPLICANT(S)

If none of the following sub-boxes is used, this sheet should not be included in the demand

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

JØRGENSEN, JUHL, Mette
13, Guldbergvej
DK-4000 Roskilde
Denmark

State (that is, country) of nationality:

Denmark

State (that is, country) of residence:

Denmark

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

MOGENSEN, Mogens
10, Krogenlundvej
DK-3540 Lynge
Denmark

State (that is, country) of nationality:

Denmark

State (that is, country) of residence:

Denmark

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

MARINA, Olga
82, 2 th., Bogholder Allé
DK-2720 Vanløse
Denmark

State (that is, country) of nationality:

Denmark

State (that is, country) of residence:

Denmark

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

State (that is, country) of nationality:

State (that is, country) of residence:

☐

Further applicants are indicated on another continuation sheet.

Box No. III AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCEThe following person is ☒ agent ☐ common representativeand ☒ has been appointed earlier and represents the applicant(s) also for international preliminary examination.☐ is hereby appointed and any earlier appointment of (an) agent(s)/common representative is hereby revoked.☐ is hereby appointed, specifically for the procedure before the International Preliminary Examining Authority, in addition to the agent(s)/common representative appointed earlier.Name and address: *(Family name followed by given name; for a legal entity, full official designation.
The address must include postal code and name of country.)*CHAS.HUDE A/S
33, H.C. Andersens Boulevard
DK-1780 Copenhagen V
Denmark

Telephone No.:

+45 33 15 45 14

Facsimile No.:

+45 33 15 45 35

Teleprinter No.:

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.**Box No. IV BASIS FOR INTERNATIONAL PRELIMINARY EXAMINATION****Statement concerning amendments:***

1. The applicant wishes the international preliminary examination to start on the basis of:

☒ the international application as originally filedthe description ☒ as originally filed☐ as amended under Article 34the claims ☒ as originally filed☐ as amended under Article 19 (together with any accompanying statement)☐ as amended under Article 34the drawings ☒ as originally filed☐ as amended under Article 342. ☐ The applicant wishes any amendment to the claims under Article 19 to be considered as reversed.3. ☐ The applicant wishes the start of the international preliminary examination to be postponed until the expiration of 20 months from the priority date unless the International Preliminary Examining Authority receives a copy of any amendments made under Article 19 or a notice from the applicant that he does not wish to make such amendments (Rule 69.1(d)). *(This check-box may be marked only where the time limit under Article 19 has not yet expired.)*

* Where no check-box is marked, international preliminary examination will start on the basis of the international application as originally filed or, where a copy of amendments to the claims under Article 19 and/or amendments of the international application under Article 34 are received by the International Preliminary Examining Authority before it has begun to draw up a written opinion or the international preliminary examination report, as so amended.

Language for the purposes of international preliminary examination: English.....

☒ which is the language in which the international application was filed.☐ which is the language of a translation furnished for the purposes of international search.☐ which is the language of publication of the international application.☐ which is the language of the translation (to be) furnished for the purposes of international preliminary examination.**Box No. V ELECTION OF STATES**The applicant hereby elects all eligible States *(that is, all States which have been designated and which are bound by Chapter II of the PCT)*

excluding the following States which the applicant wishes not to elect:

Box No. VI CHECK LIST

The demand is accompanied by the following elements, in the language referred to in Box No. IV, for the purposes of international preliminary examination:

- | | | |
|--|---|--------|
| 1. translation of international application | : | sheets |
| 2. amendments under Article 34 | : | sheets |
| 3. copy (or, where required, translation) of amendments under Article 19 | : | sheets |
| 4. copy (or, where required, translation) of statement under Article 19 | : | sheets |
| 5. letter | : | sheets |
| 6. other (<i>specify</i>) | : | sheets |

For International Preliminary
Examining Authority use only

received not received

<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

The demand is also accompanied by the item(s) marked below:

- | | |
|--|---|
| 1. <input checked="" type="checkbox"/> fee calculation sheet | 4. <input type="checkbox"/> statement explaining lack of signature |
| 2. <input type="checkbox"/> separate signed power of attorney | 5. <input type="checkbox"/> nucleotide and or amino acid sequence listing in computer readable form |
| 3. <input type="checkbox"/> copy of general power of attorney; reference number, if any: | 6. <input checked="" type="checkbox"/> other (<i>specify</i>): Copy of Search Report |

Box No. VII SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the demand).

Jørgen Siiger
Representative of the Applicant

For International Preliminary Examining Authority use only

1. Date of actual receipt of DEMAND:

2. Adjusted date of receipt of demand due to CORRECTIONS under Rule 60.1(b):

3. ☐ The date of receipt of the demand is AFTER the expiration of 19 months from the priority date and item 4 or 5, below, does not apply. ☐ The applicant has been informed accordingly.

4. ☐ The date of receipt of the demand is WITHIN the period of 19 months from the priority date as extended by virtue of Rule 80.5.

5. ☐ Although the date of receipt of the demand is after the expiration of 19 months from the priority date, the delay in arrival is EXCUSED pursuant to Rule 82.

For International Bureau use only

Demand received from IPEA on:

PCT

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

International Application No.

International Filing Date

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference
(if desired) (12 characters maximum) SI/OL. 71723

Box No. I	TITLE OF INVENTION	
	Electrochemical Cell	
Box No. II	APPLICANT	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.) FORSKNINGSCENTER RISØ 399, Frederiksborgvej DK-4000 Roskilde Denmark		<input type="checkbox"/> This person is also inventor. Telephone No. +45 46 77 46 46 Facsimile No. +45 46 77 40 33 Teleprinter No. -
State (that is, country) of nationality: Denmark		State (that is, country) of residence: Denmark
This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input checked="" type="checkbox"/> all designated States except the United States of America <input type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box		
Box No. III	FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.) PRIMDAHL, Søren 2, Skovkrogen DK-3400 Allerød Denmark		This person is: <input type="checkbox"/> applicant only <input checked="" type="checkbox"/> applicant and inventor <input type="checkbox"/> inventor only (If this check-box is marked, do not fill in below.)
State (that is, country) of nationality: Denmark		State (that is, country) of residence: Denmark
This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input checked="" type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box		
<input checked="" type="checkbox"/> Further applicants and/or (further) inventors are indicated on a continuation sheet.		
Box No. IV	AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE	
The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:		<input checked="" type="checkbox"/> agent <input type="checkbox"/> common representative
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) CHAS.HUDE A/S 33, H.C. Andersens Boulevard DK-1553 Copenhagen V Denmark		Telephone No. +45 33 15 45 14 Facsimile No. +45 33 15 45 35 Teleprinter No. 19538 hude dk
<input type="checkbox"/> Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.		

Continuation of Box No. III FURTHER APPLICANTS AND/OR (FURTHER) INVENTORS

If none of the following sub-boxes is used, this sheet should not be included in the request.

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

BAGGER, Carsten
7, Toftager, St. Valby
DK-4000 Roskilde
Denmark

This person is:

- ☐ applicant only
☒ applicant and inventor
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:
Denmark

State (that is, country) of residence:
Denmark

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

JØRGENSEN, JUHL, Mette
13, Guldbergvej
DK-4000 Roskilde
Denmark

This person is:

- ☐ applicant only
☒ applicant and inventor
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:
Denmark

State (that is, country) of residence:
Denmark

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

MOGENSEN, Mogens
10, Krogenlundvej
DK-3540 Lyngø
Denmark

This person is:

- ☐ applicant only
☒ applicant and inventor
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:
Denmark

State (that is, country) of residence:
Denmark

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

MARINA, Olga
82, 2 th., Bogholder Alle
DK-2720 Vanløse
Denmark

This person is:

- ☐ applicant only
☒ applicant and inventor
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:
Denmark

State (that is, country) of residence:
Denmark

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on another continuation sheet.

Box No.V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

Regional Patent

- ☒ **AP** ARIPO Patent: GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SL Sierra Leone, SZ Swaziland, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☒ **EA** Eurasian Patent: AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ **EP** European Patent: AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ **OA** OAPI Patent: BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line)




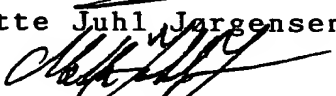
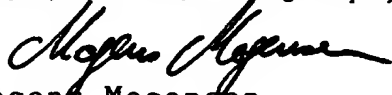

National Patent (if other kind of protection or treatment desired, specify on dotted line):

- | | |
|---|---|
| <input checked="" type="checkbox"/> AE United Arab Emirates | <input checked="" type="checkbox"/> LR Liberia |
| <input checked="" type="checkbox"/> AL Albania | <input checked="" type="checkbox"/> LS Lesotho |
| <input checked="" type="checkbox"/> AM Armenia | <input checked="" type="checkbox"/> LT Lithuania |
| <input checked="" type="checkbox"/> AT Austria and Utility Model | <input checked="" type="checkbox"/> LU Luxembourg |
| <input checked="" type="checkbox"/> AU Australia | <input checked="" type="checkbox"/> LV Latvia |
| <input checked="" type="checkbox"/> AZ Azerbaijan | <input checked="" type="checkbox"/> MD Republic of Moldova |
| <input checked="" type="checkbox"/> BA Bosnia and Herzegovina | <input checked="" type="checkbox"/> MG Madagascar |
| <input checked="" type="checkbox"/> BB Barbados | <input checked="" type="checkbox"/> MK The former Yugoslav Republic of Macedonia |
| <input checked="" type="checkbox"/> BG Bulgaria | |
| <input checked="" type="checkbox"/> BR Brazil | <input checked="" type="checkbox"/> MN Mongolia |
| <input checked="" type="checkbox"/> BY Belarus | <input checked="" type="checkbox"/> MW Malawi |
| <input checked="" type="checkbox"/> CA Canada | <input checked="" type="checkbox"/> MX Mexico |
| <input checked="" type="checkbox"/> CH and LI Switzerland and Liechtenstein | <input checked="" type="checkbox"/> NO Norway |
| <input checked="" type="checkbox"/> CN China | <input checked="" type="checkbox"/> NZ New Zealand |
| <input checked="" type="checkbox"/> CU Cuba | <input checked="" type="checkbox"/> PL Poland |
| <input checked="" type="checkbox"/> CZ Czech Republic and Utility Model | <input checked="" type="checkbox"/> PT Portugal |
| <input checked="" type="checkbox"/> DE Germany and Utility Model | <input checked="" type="checkbox"/> RO Romania |
| <input checked="" type="checkbox"/> DK Denmark and Utility Model | <input checked="" type="checkbox"/> RU Russian Federation |
| <input checked="" type="checkbox"/> EE Estonia and Utility Model | <input checked="" type="checkbox"/> SD Sudan |
| <input checked="" type="checkbox"/> ES Spain | <input checked="" type="checkbox"/> SE Sweden |
| <input checked="" type="checkbox"/> FI Finland and Utility Model | <input checked="" type="checkbox"/> SG Singapore |
| <input checked="" type="checkbox"/> GB United Kingdom | <input checked="" type="checkbox"/> SI Slovenia |
| <input checked="" type="checkbox"/> GD Grenada | <input checked="" type="checkbox"/> SK Slovakia and Utility Model |
| <input checked="" type="checkbox"/> GE Georgia | <input checked="" type="checkbox"/> SL Sierra Leone |
| <input checked="" type="checkbox"/> GH Ghana | <input checked="" type="checkbox"/> TJ Tajikistan |
| <input checked="" type="checkbox"/> GM Gambia | <input checked="" type="checkbox"/> TM Turkmenistan |
| <input checked="" type="checkbox"/> HR Croatia | <input checked="" type="checkbox"/> TR Turkey |
| <input checked="" type="checkbox"/> HU Hungary | <input checked="" type="checkbox"/> TT Trinidad and Tobago |
| <input checked="" type="checkbox"/> ID Indonesia | <input checked="" type="checkbox"/> UA Ukraine |
| <input checked="" type="checkbox"/> IL Israel | <input checked="" type="checkbox"/> UG Uganda |
| <input checked="" type="checkbox"/> IN India | <input checked="" type="checkbox"/> US United States of America |
| <input checked="" type="checkbox"/> IS Iceland | |
| <input checked="" type="checkbox"/> JP Japan | <input checked="" type="checkbox"/> UZ Uzbekistan |
| <input checked="" type="checkbox"/> KE Kenya | <input checked="" type="checkbox"/> VN Viet Nam |
| <input checked="" type="checkbox"/> KG Kyrgyzstan | <input checked="" type="checkbox"/> YU Yugoslavia |
| <input checked="" type="checkbox"/> KP Democratic People's Republic of Korea | <input checked="" type="checkbox"/> ZA South Africa |
| | <input checked="" type="checkbox"/> ZW Zimbabwe |
| <input checked="" type="checkbox"/> KR Republic of Korea | |
| <input checked="" type="checkbox"/> KZ Kazakhstan | |
| <input checked="" type="checkbox"/> LC Saint Lucia | |
| <input checked="" type="checkbox"/> LK Sri Lanka | |

Check-boxes reserved for designating States which have become party to the PCT after issuance of this sheet:

- ☒ **MA** Morocco // ☒ **DM** Dominica
- ☒ **TZ** Tanzania // ☒ **CR** Costa Rica

Precautionary Designation Statement: In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation of a designation consists of the filing of a notice specifying that designation and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.)

Box No. VI PRIORITY CLAIM		<input type="checkbox"/> Further priority claims are indicated in the Supplemental Box.		
Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is:		
		national application: country	regional application:* regional Office	international application: receiving Office
item (1) 17 November 1998 (17 11 1998)	PA 1998 01497	Denmark		
item (2)				
item (3)				
<input type="checkbox"/> The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office) identified above as item(s):				
* Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.				
Box No. VII INTERNATIONAL SEARCHING AUTHORITY				
Choice of International Searching Authority (ISA) (if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used).		Request to use results of earlier search; reference to that search (if an earlier search has been carried out by or requested from the International Searching Authority): Date (day/month/year) Number Country (or regional Office)		
ISA / SE				
Box No. VIII CHECK LIST; LANGUAGE OF FILING				
This international application contains the following number of sheets: request : 4 description (excluding sequence listing part) : 19 claims : 1 abstract : 1 drawings : 12 sequence listing part of description : Total number of sheets : 37		This international application is accompanied by the item(s) marked below: 1. <input checked="" type="checkbox"/> fee calculation sheet 2. <input type="checkbox"/> separate signed power of attorney 3. <input type="checkbox"/> copy of general power of attorney; reference number, if any: 4. <input type="checkbox"/> statement explaining lack of signature 5. <input checked="" type="checkbox"/> priority document(s) identified in Box No. VI as item(s): 6. <input type="checkbox"/> translation of international application into (language): 7. <input type="checkbox"/> separate indications concerning deposited microorganism or other biological material 8. <input type="checkbox"/> nucleotide and/or amino acid sequence listing in computer readable form 9. <input checked="" type="checkbox"/> other (specify): Copy of 9 June 1999 in Danish Appln.		
Figure of the drawings which should accompany the abstract: 9		Language of filing of the international application: English		
Box No. IX SIGNATURE OF APPLICANT OR AGENT				
Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).				
 Jørgen Kjems Managing Director Forskningscenter Risø		 Søren Primdahl  Carsten Bagger  Mette Juhl Jørgensen		
		 Mogens Mogensen  Olga Marina		

For receiving Office use only	
1. Date of actual receipt of the purported international application:	2. Drawings: <input type="checkbox"/> received: <input type="checkbox"/> not received:
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:	
4. Date of timely receipt of the required corrections under PCT Article 11(2):	
5. International Searching Authority (if two or more are competent): ISA /	
6. <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid.	

For International Bureau use only	
Date of receipt of the record copy by the International Bureau:	

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

To: CHAS. HUDE A/S H.C. Andersens Boulevard 33 DK-1780 Copenhagen V DANEMARK		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">Sagstype</td> <td style="width: 25%;">J.nr.</td> <td style="width: 25%;">Ing.</td> <td style="width: 25%;"></td> </tr> <tr> <td>33 PA</td> <td>71723</td> <td>Si</td> <td></td> </tr> <tr> <td colspan="4" style="text-align: center; padding: 5px;">28 FEB. 2001</td> </tr> <tr> <td>AS 400</td> <td>Ve</td> <td>Til hvem</td> <td>Si</td> </tr> </table>		Sagstype	J.nr.	Ing.		33 PA	71723	Si		28 FEB. 2001				AS 400	Ve	Til hvem	Si
Sagstype	J.nr.	Ing.																	
33 PA	71723	Si																	
28 FEB. 2001																			
AS 400	Ve	Til hvem	Si																
		NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT (PCT Rule 71.1)																	
		Date of mailing (day/month/year) 26.02.2001																	
Applicant's or agent's file reference 71723 Si/TK		IMPORTANT NOTIFICATION																	
International application No. PCT/DK99/00631	International filing date (day/month/year) 17/11/1999	Priority date (day/month/year) 17/11/1998																	
Applicant FORSKNINGSCENTER RISO et al.																			

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/ <div style="display: flex; align-items: center;"> <div> European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465 </div> </div>	Authorized officer Krage, D Tel. +49 89 2399-7530
--	---



PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 71723 Si/TK	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/DK99/00631	International filing date (day/month/year) 17/11/1999	Priority date (day/month/year) 17/11/1998
International Patent Classification (IPC) or national classification and IPC H01M4/86		
Applicant FORSKNINGSCENTER RISO et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 2 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 02/06/2000	Date of completion of this report 26.02.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Haering, C Telephone No. +49 89 2399 8010 

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/DK99/00631

I. Basis of the report

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Rules 70.16 and 70.17).):*

Description, pages:

2-19 as originally filed

1 as received on 10/10/2000 with letter of 09/10/2000

Claims, No.:

1,2 as received on 20/12/2000 with letter of 19/12/2000

Drawings, sheets:

1/12-12/12 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/DK99/00631

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1,2
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1,2
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1,2
	No:	Claims	

- 2. Citations and explanations
see separate sheet**

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/DK99/00631

Corrections and amendments:

The amendments of the earlier sets of claims are allowable under Article 34.2)b) PCT, since they consisted in:

- modifying page 1 of the description in accordance with the new set of claims,
- deleting claim 3,
- ~~restricting the added Mn to the active zone in claim 1, and~~
- restricting the added amount of Mn ~~only to the part of the electrode~~ spaced more than 20µm.

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Disclosures: = JP 5-190163?

- 1.1. Document D1 discloses an improved SOFC, wherein, either the electrolyte is doped at the surface with Mn, which amount can vary between 0,2 and 13,4 mol%, or the bulk electrode is doped with 5 to 50 % Mn.
- 1.2. Document D2 = US-A-3 496 021 of the search report discloses the use of Mn in both anode and cathode of a molten carbonate fuel cell (MCFC). However, the materials conventionally used to make MCFC's are different than those to make SOFC's. This document is therefore not relevant, neither for novelty nor for inventive step.

2. Novelty:

- 2.1. The subject-matter of claim 1 is novel because, in the present application, Mn is added in the electrode.
- 2.2. The subject-matter of claim 2, which depends on claim 1, is a fortiori novel.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/DK99/00631

3. *Inventive step:*

- 3.1. Document D1, which is considered to represent the most relevant state of the art, discloses a layer doped with Mn from which the subject-matter of claim 1 differs in that:
- a. Mn is added in the surface of the electrode, and,
 - b. the amount of Mn is very low.
- 3.2. The problem to be solved by the present invention may therefore be regarded as the minimisation of the polarisation resistance of an already optimised electrode.
- 3.3. That problem has clearly not been solved in D1, in which the polarisation resistance is $0,5 \Omega \cdot \text{cm}^2$, whereas it is $0,02 \Omega \cdot \text{cm}^2$ in the present application.
- 3.4. Furthermore, in D1, the polarisation resistance decreases with increasing Mn-content. In fact, it is suggested to add more than 5 at% at the surface of the electrolyte and up to 20 at% in the bulk of the electrode (see fig. 2 and 4 of D1).
- 3.5. Thus, the subject-matter of both claims 1 and 2 of the present application are considered to involve an inventive step.

Title: Electrochemical cell

Technical Field

The invention relates to an electrochemical cell, such as an SOFC cell, comprising a nickel based electrode structure, such as in form of an Ni/YSZ anode, to which Mn
5 has been added.

Background Art

From JP 5-190183 it is known to add Mn to the Ni/YSZ anode in an amount of 5 to 50 metal atom % of the anode material. As a result the reaction resistance R_p of the anode is reduced.

10 Brief Description of the Invention.

The object of the present invention is to show how the reaction resistance R_p can be further reduced as well as how further advantages in form of an increased conductivity and a limited catalytic activity can be obtained.

An electrochemical cell of the above type is according to the invention characterized
15 in that the added amount of Mn to the zone of the electrode extending less than 20 μm from the electrolyte represents 0.5 to 5 metal atom %, preferably 1 to 4 metal atom %, especially 2 to 3 metal atom %.

An electrochemical cell can be produced by applying electrodes onto a carrier electrolyte or electrolyte on a carrier electrode. The cell can be produced by intermediate
20 sinterings or be sintered when more or all the components are assembled.

An electrochemical cell can be used within several fields, said cell comprising an electrolyte, which is also called a membrane, in contact with two electrodes of a

Claims

1. An electrochemical cell, such as an SOFC cell, including a nickel based electrode structure, such as for instance in form of an Ni/YSZ electrode, to which Mn has been added, c h a r a c t e r i z e d in that the added amount
5 of Mn to the active zone of the electrode extending less than 20 μm from the electrolyte represents 0.5 to 5 metal atom%, preferably 1 to 4 metal atom%, in particular 2 to 3 metal atom%.
2. An electrochemical cell as claimed in claim 1, c h a r a c t e r i z e d in that the added amount of Mn in the part of the electrode spaced more than
10 20 μm from the electrolyte represents 0.5 to 10 metal atom%, preferably 1 to 6 metal atom%, in particular 4 to 5 metal atom%.

INTERNET COOPERATION TREATY

PCT

NOTICE INFORMING THE APPLICANT OF THE COMMUNICATION OF THE INTERNATIONAL APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

From the INTERNATIONAL BUREAU

To:

CHAS.HUDE A/S
H.C. Andersens Boulevard 33
DK-1553 Copenhagen V
DANEMARK

Sagstype <i>PIA</i>	J.nr. <i>71723</i>	Ing. <i>SL</i>
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- 2 JUNI 2000

Date of mailing (day/month/year)

25 May 2000 (25.05.00)

Applicant's or agent's file reference

SI/OL. 71723

400 400 *TH* Til hvem *TH*
IMPORTANT NOTICE

International application No.

PCT/DK99/00631

International filing date (day/month/year)

17 November 1999 (17.11.99)

Priority date (day/month/year)

17 November 1998 (17.11.98)

Applicant

FORSKNINGSCENTER RISØ et al

1. Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this Notice:

AU,CN,JP,KP,KR,MA,US

In accordance with Rule 47.1(c), third sentence, those Offices will accept the present Notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:

AE,AL,AM,AP,AT,AZ,BA,BB,BG,BR,BY,CA,CH,CR,CU,CZ,DE,DK,DM,EA,EE,EP,ES,FI,GB,GD,GE,
GH,GM,HR,HU,ID,IL,IN,IS,KE,KG,KZ,LC,LK,LR,LS,LT,LU,LV,MD,MG,MK,MN,MW,MX,NO,NZ,OA,
PL,PT,RO,RU,SD,SE,SG,SI,SK,SL,TJ,TM,TR,TT,TZ,UA,UG,UZ,VN,YU,ZA,ZW

The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).

3. Enclosed with this Notice is a copy of the international application as published by the International Bureau on

25 May 2000 (25.05.00) under No. WO 00/30194

REMINDER REGARDING CHAPTER II (Article 31(2)(a) and Rule 54.2)

If the applicant wishes to postpone entry into the national phase until 30 months (or later in some Offices) from the priority date, a demand for international preliminary examination must be filed with the competent International Preliminary Examining Authority before the expiration of 19 months from the priority date.

It is the applicant's sole responsibility to monitor the 19-month time limit.

Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination.

REMINDER REGARDING ENTRY INTO THE NATIONAL PHASE (Article 22 or 39(1))

If the applicant wishes to proceed with the international application in the national phase, he must, within 20 months or 30 months, or later in some Offices, perform the acts referred to therein before each designated or elected Office.

For further important information on the time limits and acts to be performed for entering the national phase, see the Annex to Form PCT/IB/301 (Notification of Receipt of Record Copy) and Volume II of the PCT Applicant's Guide.

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. (41-22) 740.14.35

Authorized officer

J. Zahra

Telephone No. (41-22) 338.83.38

PCT COOPERATION TREATY

PCT

NOTIFICATION CONCERNING
SUBMISSION OR TRANSMITTAL
OF PRIORITY DOCUMENT

(PCT Administrative Instructions, Section 411)

From the INTERNATIONAL BUREAU

To:

CHAS.HUDE A/S
H.C. Andersens Boulevard 33
DK-1553 Copenhagen V
DANEMARK

Date of mailing (day/month/year) 16 December 1999 (16.12.99)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference SI/OL. 71723	
International application No. PCT/DK99/00631	
International filing date (day/month/year) 17 November 1999 (17.11.99)	
International publication date (day/month/year) Not yet published	Priority date (day/month/year) 17 November 1998 (17.11.98)
Applicant FORSKNINGSCENTER RISØ et al	

- The applicant is hereby notified of the date of receipt (except where the letters "NR" appear in the right-hand column) by the International Bureau of the priority document(s) relating to the earlier application(s) indicated below. Unless otherwise indicated by an asterisk appearing next to a date of receipt, or by the letters "NR", in the right-hand column, the priority document concerned was submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b).
- This updates and replaces any previously issued notification concerning submission or transmittal of priority documents.
- An asterisk(*) appearing next to a date of receipt, in the right-hand column, denotes a priority document submitted or transmitted to the International Bureau but not in compliance with Rule 17.1(a) or (b). In such a case, **the attention of the applicant is directed** to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.
- The letters "NR" appearing in the right-hand column denote a priority document which was not received by the International Bureau or which the applicant did not request the receiving Office to prepare and transmit to the International Bureau, as provided by Rule 17.1(a) or (b), respectively. In such a case, **the attention of the applicant is directed** to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

<u>Priority date</u>	<u>Priority application No.</u>	<u>Country or regional Office or PCT receiving Office</u>	<u>Date of receipt of priority document</u>
17 Nove 1998 (17.11.98)	PA 1998 01497	DK	08 Dece 1999 (08.12.99)

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. (41-22) 740.14.35

Authorized officer

Marie-José Devillard

Telephone No. (41-22) 338.83.38

PATENT COOPERATION TREATY

PCT

INFORMATION CONCERNING ELECTED OFFICES NOTIFIED OF THEIR ELECTION

(PCT Rule 61.3)

From the INTERNATIONAL BUREAU

To:

CHAS.HUDE A/S
H.C. Andersens Boulevard 33
DK-1553 Copenhagen V
DANEMARK

Sagstype	J.nr.	Ing.
PA	71723	Si
7 AUG. 2000		
AS 400	Til hvem TK	

Date of mailing (day/month/year) 02 August 2000 (02.08.00)		IMPORTANT INFORMATION	
Applicant's or agent's file reference SI/OL. 71723			
International application No. PCT/DK99/00631	International filing date (day/month/year) 17 November 1999 (17.11.99)	Priority date (day/month/year) 17 November 1998 (17.11.98)	
Applicant FORSKNINGSCENTER RISØ et al			

1. The applicant is hereby informed that the International Bureau has, according to Article 31(7), notified each of the following Offices of its election:

AP : GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW
EP : AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE
National : AU, BG, BR, CA, CN, CZ, DE, IL, JP, KP, KR, MN, NO, NZ, PL, RO, RU, SE, SK, US


2. The following Offices have waived the requirement for the notification of their election; the notification will be sent to them by the International Bureau only upon their request:

EA : AM, AZ, BY, KG, KZ, MD, RU, TJ, TM
OA : BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG
National : AE, AL, AM, AT, AZ, BA, BB, BY, CH, CR, CU, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IN, IS, KE, KG, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MW, MX, PT, SD, SG, SI, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW

3. The applicant is reminded that he must enter the "national phase" before the expiration of 30 months from the priority date before each of the Offices listed above. This must be done by paying the national fee(s) and furnishing, if prescribed, a translation of the international application (Article 39(1)(a)), as well as, where applicable, by furnishing a translation of any annexes of the international preliminary examination report (Article 36(3)(b) and Rule 74.1).

Some offices have fixed time limits expiring later than the above-mentioned time limit. For detailed information about the applicable time limits and the acts to be performed upon entry into the national phase before a particular Office, see Volume II of the PCT Applicant's Guide.

The entry into the European regional phase is postponed until 31 months from the priority date for all States designated for the purposes of obtaining a European patent.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer: <div style="text-align: right;">  Claudio Borton </div>
Facsimile No. (41-22) 740.14.35	Telephone No. (41-22) 338.83.38

PATENT COOPERATION TREATY

by fax and post

From the:
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To: CHAS. HUDE A/S H.C. Andersens Boulevard 33 DK-1553 Copenhagen V DANEMARK FAX NO: +45 33 15 45 35	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Sagstyp PA</td> <td style="width: 33%;">J.nr. 71723</td> <td style="width: 33%;">Ing. SI</td> </tr> <tr> <td colspan="3" style="text-align: center;">14 AUG. 2000</td> </tr> <tr> <td>AS 400 535</td> <td>EP 107 (Tb)</td> <td>TU hvam SI</td> </tr> </table>	Sagstyp PA	J.nr. 71723	Ing. SI	14 AUG. 2000			AS 400 535	EP 107 (Tb)	TU hvam SI	<h2 style="margin: 0;">PCT</h2> <h3 style="margin: 0;">WRITTEN OPINION</h3> <p style="margin: 0;">(PCT Rule 66)</p>
Sagstyp PA	J.nr. 71723	Ing. SI									
14 AUG. 2000											
AS 400 535	EP 107 (Tb)	TU hvam SI									
Date of mailing (day/month/year) 10.08.2000		REPLY DUE within 3 month(s) from the above date of mailing									
Applicant's or agent's file reference 71723 SI/TK		International application No. PCT/DK99/00631									
International filing date (day/month/year) 17/11/1999		Priority date (day/month/year) 17/11/1998									
International Patent Classification (IPC) or both national classification and IPC H01M4/86											
Applicant FORSKNINGSCENTER RISO et al.											

1. This written opinion is the **first** drawn up by this International Preliminary Examining Authority.
2. This opinion contains indications relating to the following items:
 - I ☒ Basis of the opinion
 - II ☐ Priority
 - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☐ Lack of unity of invention
 - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain document cited
 - VII ☐ Certain defects in the international application
 - VIII ☒ Certain observations on the international application
3. The applicant is hereby **invited to reply** to this opinion.

When? See the time limit indicated above. The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d).

How? By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

Also: For an additional opportunity to submit amendments, see Rule 66.4.
 For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4 bis.
 For an informal communication with the examiner, see Rule 66.6.

If no reply is filed, the international preliminary examination report will be established on the basis of this opinion.
4. The final date by which the international preliminary examination report must be established according to Rule 69.2 is: **17/03/2001**.

Name and mailing address of the international preliminary examining authority:

European Patent Office
 D-80298 Munich
 Tel. +49 89 2399 - 0 Tx: 523656 epmu d
 Fax: +49 89 2399 - 4465

Authorized officer / Examiner

Haering, C

Formalities officer (incl. extension of time limits)
 Büchler, S
 Telephone No. +49 89 2399 8090



I. Basis of the opinion

1. This opinion has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed".)*:

Description, pages:

1-19 as originally filed

Claims, No.:

1-3 as originally filed

Drawings, sheets:

1/12-12/12 as originally filed

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

3. This opinion has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. Statement**

Novelty (N)	Claims 1; 2: no
Inventive step (IS)	Claims 3: no
Industrial applicability (IA)	Claims

2. Citations and explanations

see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following document:

D1: JP-A-05 190 183 (Abstract)

1. Novelty:

- 1.1. Document D1 discloses the use of Mn in the anode of an SOFC in order to reduce the polarisation resistance. It is contained in a molar ratio of 1-15 mol% for all the metal elements on the surface of the anode which is at the electrolyte's side, i.e. in the part of the anode extending less than 20 μm from the electrolyte. This concentration range overlaps the one claimed in claim 1 of the present application. Thus, the subject-matter of claim 1 lacks novelty under Article 33 (1) and (2) PCT.
- 1.2. Therefore, it is considered, by implication, that the molar Ratio of 5 to 50 % Mn, also disclosed in D1 relates to Manganese present in the bulk of the electrode, i.e. in the regions spaced more than 20 μm from the electrolyte. Thus, the subject-matter of claim 2 is also not novel.

2. Inventive step:

The present application refers to an electrolyte-supported SOFC. The concept of these cells is independent of the composition of their different parts, i.e. the anode, the electrolyte and the cathode. The use of Mn in the anode is known from D1, providing the same advantages as in the present application. Although it is not clear whether D1 relates to anode-supported cells, in any event the skilled person would regard it as a normal option to use Mn also in anodes for anode-supported cells, as claimed in claim 3 in order to solve the problem posed. Thus, the subject-matter of claim 3 lacks inventive step under Article 33(1) and (3) PCT.

3. It is also noted that independent claim 3 is silent about the Mn atom% at the surface of the "carrier structure", which, on the other hand, is specified in independent claim 1 directed to an electrochemical cell. The question therefore arises whether said Mn atom% is an essential feature of the invention. This point, in addition to the point raised under 2., is relevant to the question of inventive step for the subject-matter of claim 3 and, subject to the points raised under 1.1. being met, also of claim 1.

Re Item VIII

Certain observations on the international application

In the description of the present application, only the electrolyte supported fuel cell are described. However, claim 3 is related to an anode supported cell. Thus this claim is not supported by the description (Article 6 PCT).

PATENT COOPERATION TREATY

From the:
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

WRITTEN OPINION

(PCT Rule 66)

<p>To: PA</p> <p>CHAS. HUDE A/S H.C. Andersens Boulevard 33 DK-1780 Copenhagen V DANEMARK</p> <table border="1" style="width: 100%; margin-top: 10px;"> <tr> <td style="width: 25%;">Sagstype</td> <td style="width: 25%;">J.nr.</td> <td style="width: 25%;">Ing.</td> <td style="width: 25%;"></td> </tr> <tr> <td>33</td> <td>71723</td> <td>Si</td> <td></td> </tr> <tr> <td colspan="4" style="text-align: center; padding: 10px;">29 NOV. 2000</td> </tr> <tr> <td>AS 400</td> <td>Ve</td> <td>Til hvem</td> <td>Si</td> </tr> </table>	Sagstype	J.nr.	Ing.		33	71723	Si		29 NOV. 2000				AS 400	Ve	Til hvem	Si	<table border="1" style="width: 100%; margin-top: 10px;"> <tr> <td style="width: 50%;">Date of mailing (day/month/year)</td> <td style="width: 50%;">27-12-2000 27.11.2000</td> </tr> </table> <table border="1" style="width: 100%; margin-top: 10px;"> <tr> <td style="width: 50%;">Applicant's or agent's file reference 71723 SI/TK</td> <td style="width: 50%;"> REPLY DUE within 1 month(s) from the above date of mailing </td> </tr> </table> <table border="1" style="width: 100%; margin-top: 10px;"> <tr> <td style="width: 33%;">International application No. PCT/DK99/00631</td> <td style="width: 33%;">International filing date (day/month/year) 17/11/1999</td> <td style="width: 33%;">Priority date (day/month/year) 17/11/1998</td> </tr> </table> <p>International Patent Classification (IPC) or both national classification and IPC H01M4/86</p> <p>Applicant FORSKNINGSCENTER RISO et al.</p>	Date of mailing (day/month/year)	27-12-2000 27.11.2000	Applicant's or agent's file reference 71723 SI/TK	REPLY DUE within 1 month(s) from the above date of mailing	International application No. PCT/DK99/00631	International filing date (day/month/year) 17/11/1999	Priority date (day/month/year) 17/11/1998
Sagstype	J.nr.	Ing.																						
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International application No. PCT/DK99/00631	International filing date (day/month/year) 17/11/1999	Priority date (day/month/year) 17/11/1998																						

1. This written opinion is the **second** drawn up by this International Preliminary Examining Authority.
2. This opinion contains indications relating to the following items:

I	<input checked="" type="checkbox"/>	Basis of the opinion
II	<input type="checkbox"/>	Priority
III	<input type="checkbox"/>	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
IV	<input type="checkbox"/>	Lack of unity of invention
V	<input checked="" type="checkbox"/>	Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
VI	<input type="checkbox"/>	Certain document cited
VII	<input type="checkbox"/>	Certain defects in the international application
VIII	<input checked="" type="checkbox"/>	Certain observations on the international application
3. The applicant is hereby invited to reply to this opinion.

When?	See the time limit indicated above. The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d).
How?	By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.
Also:	For an additional opportunity to submit amendments, see Rule 66.4. For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4 bis. For an informal communication with the examiner, see Rule 66.6.

If no reply is filed, the international preliminary examination report will be established on the basis of this opinion.
4. The final date by which the International preliminary examination report must be established according to Rule 69.2 is: 17/03/2001.

<p>Name and mailing address of the international preliminary examining authority:</p> <div style="display: flex; align-items: center;"> <div> <p>European Patent Office</p> <p>D-80298 Munich</p> <p>Tel. +49 89 2399 - 0 Tx: 523656 epmu d</p> <p>Fax: +49 89 2399 - 4465</p> </div> </div>	<p>Authorized officer / Examiner</p> <p>Haering, C</p> <hr/> <p>Formalities officer (incl. extension of time limits)</p> <p>Krage, D</p> <p>Telephone No. +49 89 2399 7530</p>
--	--



WRITTEN OPINION

International application No. PCT/DK99/00631

I. Basis of the opinion

1. This opinion has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed".*):

Description, pages:

2-19 as originally filed

1 as received on 10/10/2000 with letter of 09/10/2000

Claims, No.:

1,2 as originally filed

Drawings, sheets:

1/12-12/12 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

WRITTEN OPINION

International application No. PCT/DK99/00631

- ☐ the description, pages:
☒ the claims, Nos.: 3
☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N) Claims 1,2: YES

Inventive step (IS) Claims 1,2: NO

Industrial applicability (IA) Claims 1,2: YES

2. Citations and explanations
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Inventive step:

1. Claim 1:

The subject-matter lacks inventive step for the following reasons:

- 1.1. The problem to be solved is clearly to decrease the polarisation resistance. This can be solved by adding a certain amount of Mn in the three phase interphase, as disclosed in D1, i.e. at the interphase between the gas conductor, the ionic conductor and the electronic conductor. This is done by D1, wherein 0,2 to 13,4 mol% Mn is added at the surface of the electrolyte. However, it is obvious for the person skilled that this amount of Mn can be added either in the electrode or in the electrolyte, since it has to be finally part of the active zone, which is the three phase interphase.
- 1.2. In fact, if the person skilled knows from D1 that Mn is a good additive to reduce the polarisation resistance between anode and electrolyte, and noticing that the Mn has been put at the surface of the electrolyte on the side of the anode, then he would be prompted to add Mn preferably at the surface of the anode rather than of the electrolyte, since he knows that the three phases interface is part of the anode, i.e. it is the role of the anode to have all three conductors, the ionic, the electronic and the gaseous one.

Thus, the present application proposes only an alternative solution to the problem posed, which brings an expected improvement.

2. Claim 2:

In claim 2, 0,5 to 10 atom% Mn is added in the part preferably spaced more than 20 μm from the electrolyte, In D2, an amount of between 5 and 50% Mn is added in the whole electrode. Thus the subject-matter of claim 2 lacks inventive step.

Re Item VIII

Certain observations on the international application

Claim 2 is not clear, since the amount of Mn defined as being added in the part of the electrode which is "preferably" spaced more than 20 μm means also that this amount of Mn can also be added in the part spaced less than 20 μm . And since this amount is inconsistent to the amount added in in part, as claimed in claim 1, which this claim depend on, the technical feature of claim 2 is therefore not clearly defined. However this objection can be overcome by deleting "preferably" involving the part of the electrode.



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**Europäisches
Patentamt**

Generaldirektion 2

**European
Patent Office**

Directorate General 2

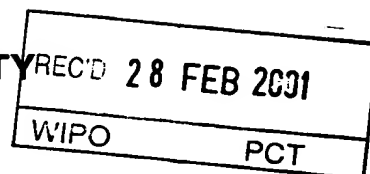
**Office européen
des brevets**

Direction Générale 2

Correspondence with the EPO on PCT Chapter II demands

In order to ensure that your PCT Chapter II demand is dealt with as promptly as possible you are requested to use the enclosed self-adhesive labels with any correspondence relating to the demand sent to the Munich Office.

One of these labels should be affixed to a prominent place in the upper part of the letter or form etc. which you are filing.



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 71723 SI/TK		FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/DK99/00631	International filing date (day/month/year) 17/11/1999	Priority date (day/month/year) 17/11/1998	
International Patent Classification (IPC) or national classification and IPC H01M4/86			
Applicant FORSKNINGSCENTER RISO et al.			



1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

 These annexes consist of a total of 2 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 02/06/2000	Date of completion of this report 26.02.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Haering, C Telephone No. +49 89 2399 8010 

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/DK99/00631

I. Basis of the report

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Rules 70.16 and 70.17).):*

Description, pages:

2-19	as originally filed			
1	as received on	10/10/2000	with letter of	09/10/2000

Claims, No.:

1,2	as received on	20/12/2000	with letter of	19/12/2000
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Drawings, sheets:

1/12-12/12	as originally filed
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2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/DK99/00631

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1,2
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1,2
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1,2
	No:	Claims	

- 2. Citations and explanations**
see separate sheet

Corrections and amendments:

The amendments of the earlier sets of claims are allowable under Article 34.2)b) PCT, since they consisted in:

- modifying page 1 of the description in accordance with the new set of claims,
- deleting claim 3,
- restricting the added Mn to the **active** zone in claim 1, and
- restricting the added amount of Mn **only to the part** of the electrode spaced more than 20µm.

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. *Disclosures:*

- 1.1. Document D1 discloses an improved SOFC, wherein, either the electrolyte is doped at the surface with Mn, which amount can vary between 0,2 and 13,4 mol%, or the bulk electrode is doped with 5 to 50 % Mn.
- 1.2. Document D2 = US-A-3 496 021 of the search report discloses the use of Mn in both anode and cathode of a molten carbonate fuel cell (MCFC). However, the materials conventionally used to make MCFC's are different than those to make SOFC's. This document is therefore not relevant, neither for novelty nor for inventive step.

2. *Novelty:*

- 2.1. The subject-matter of claim 1 is novel because, in the present application, Mn is added in the electrode.
- 2.2. The subject-matter of claim 2, which depends on claim 1, is a fortiori novel.

3. *Inventive step:*

- 3.1. Document D1, which is considered to represent the most relevant state of the art, discloses a layer doped with Mn from which the subject-matter of claim 1 differs in that:
- a. Mn is added in the surface of the electrode, and,
 - b. the amount of Mn is very low.
- 3.2. The problem to be solved by the present invention may therefore be regarded as the minimisation of the polarisation resistance of an already optimised electrode.
- 3.3. That problem has clearly not been solved in D1, in which the polarisation resistance is $0,5 \Omega \cdot \text{cm}^2$, whereas it is $0,02 \Omega \cdot \text{cm}^2$ in the present application.
- 3.4. Furthermore, in D1, the polarisation resistance decreases with increasing Mn-content. In fact, it is suggested to add more than 5 at% at the surface of the electrolyte and up to 20 at% in the bulk of the electrode (see fig. 2 and 4 of D1).
- 3.5. Thus, the subject-matter of both claims 1 and 2 of the present application are considered to involve an inventive step.

PATENT COOPERATION TREATY

From the:
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

WRITTEN OPINION

(PCT Rule 66)

To:		PA	
CHAS. HUDE A/S	Sagstype	J.nr.	Ing.
H.C. Andersens Boulevard 33	33	71723	Si
DK-1780 Copenhagen V	29 NOV. 2000		
DANEMARK	AS 400	Ve	Til hvem Si
Date of mailing (day/month/year)		27-12-2000 27.11.2000	
Applicant's or agent's file reference 71723 Si/TK		REPLY DUE within 1 month(s) from the above date of mailing	
International application No. PCT/DK99/00631	International filing date (day/month/year) 17/11/1999	Priority date (day/month/year) 17/11/1998	
International Patent Classification (IPC) or both national classification and IPC H01M4/86			
Applicant FORSKNINGSCENTER RISO et al.			


- This written opinion is the **second** drawn up by this International Preliminary Examining Authority.
- This opinion contains indications relating to the following items;
 - ☒ Basis of the opinion
 - ☐ Priority
 - ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - ☐ Lack of unity of invention
 - ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - ☐ Certain document cited
 - ☐ Certain defects in the international application
 - ☒ Certain observations on the international application
- The applicant is hereby **invited to reply** to this opinion.

When? See the time limit indicated above. The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d).

How? By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

Also: For an additional opportunity to submit amendments, see Rule 66.4.
For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4 bis.
For an informal communication with the examiner, see Rule 66.6.

If no reply is filed, the international preliminary examination report will be established on the basis of this opinion.
- The final date by which the international preliminary examination report must be established according to Rule 69.2 is: 17/03/2001.

Name and mailing address of the international preliminary examining authority:	Authorized officer / Examiner
 European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Haering, C Formalities officer (incl. extension of time limits) Krage, D Telephone No. +49 89 2399 7530



WRITTEN OPINION

International application No. PCT/DK99/00631

I. Basis of the opinion

1. This opinion has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed".*):

Description, pages:

2-19 as originally filed
1 as received on 10/10/2000 with letter of 09/10/2000

Claims, No.:

1,2 as originally filed

Drawings, sheets:

1/12-12/12 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

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- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

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- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

WRITTEN OPINION

International application No. PCT/DK99/00631

- ☐ the description, pages:
☒ the claims, Nos.: 3
☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 1,2: YES
Inventive step (IS)	Claims 1,2: NO
Industrial applicability (IA)	Claims 1,2: YES

2. Citations and explanations
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Inventive step:

1. Claim 1:

The subject-matter lacks inventive step for the following reasons:

- 1.1. The problem to be solved is clearly to decrease the polarisation resistance. This can be solved by adding a certain amount of Mn in the three phase interphase, as disclosed in D1, i.e. at the interphase between the gas conductor, the ionic conductor and the electronic conductor. This is done by D1, wherein 0,2 to 13,4 mol% Mn is added at the surface of the electrolyte. However, it is obvious for the person skilled that this amount of Mn can be added either in the electrode or in the electrolyte, since it has to be finally part of the active zone, which is the three phase interphase.
- 1.2. In fact, if the person skilled knows from D1 that Mn is a good additive to reduce the polarisation resistance between anode and electrolyte, and noticing that the Mn has been put at the surface of the electrolyte on the side of the anode, then he would be prompted to add Mn preferably at the surface of the anode rather than of the electrolyte, since he knows that the three phases interface is part of the anode, i.e. it is the role of the anode to have all three conductors, the ionic, the electronic and the gaseous one.

Thus, the present application proposes only an alternative solution to the problem posed, which brings an expected improvement.

2. Claim 2:

In claim 2, 0,5 to 10 atom% Mn is added in the part preferably spaced more than 20 μm from the electrolyte, In D2, an amount of between 5 and 50% Mn is added in the whole electrode. Thus the subject-matter of claim 2 lacks inventive step.

Re Item VIII

Certain observations on the international application

Claim 2 is not clear, since the amount of Mn defined as being added in the part of the electrode which is "preferably" spaced more than 20 μm means also that this amount of Mn can also be added in the part spaced less than 20 μm . And since this amount is inconsistent to the amount added in in part, as claimed in claim 1, which this claim depend on, the technical feature of claim 2 is therefore not clearly defined. However this objection can be overcome by deleting "preferably" involving the part of the electrode.

RECEIVED BY
ART 34 ANDT

12/PR.T.S

09/831931

Rec'd PCT/PTO 1 5 MAY 2001

Title: Electrochemical cell

Technical Field

The invention relates to an electrochemical cell, such as an SOFC cell, comprising a nickel based electrode structure, such as in form of an Ni/YSZ anode, to which Mn
5 has been added.

Background Art

It is known from JP 5-190183 to add Mn to the Ni/YSZ anode in an amount of 5 to 50 metal atom% of the anode material. As a result the reaction resistance (R_p) of the anode is reduced.

10 Brief Description of the Invention.

The object of the present invention is to show how the reaction resistance R_p can be further reduced as well as how further advantages in form of an increased conductivity and a limited catalytic activity can be obtained.

An electrochemical cell of the above type is according to the invention characterized
15 in that the added amount of Mn represents 0.5 to 5 metal atom%, preferably 1 to 4 metal atom%, especially 2 to 3 metal atom%.

An electrochemical cell can be produced by applying electrodes onto a carrier electrolyte or electrolyte on a carrier electrode. The cell can be produced by intermediate sinterings or be sintered when more or all the components are assembled.

20 An electrochemical cell can be used within several fields, said cell comprising an electrolyte, which is also called a membrane, in contact with two electrodes of a

Claims

1. An electrochemical cell, such as an SOFC cell, including a nickel based electrode structure, such as for instance in form of an Ni/YSZ electrode, to which Mn has been added, c h a r a c t e r i z e d in that the added amount of Mn of the part of the
5 electrode extending less than 20 μm from the electrolyte represents 0.5 to 5 metal atom%, preferably 1 to 4 metal atom%, in particular 2 to 3 metal atom%.
2. An electrochemical cell as claimed in claim 1, c h a r a c t e r i z e d in that the added amount of Mn in the part of the electrode preferably spaced more than 20 μm from the electrolyte represents 0.5 to 10 metal atom%, preferably 1 to 6 metal
10 atom%, in particular 4 to 5 metal atom%.
3. Carrier structure based on Ni for contacting and physical support of an electrochemical cell, such as for instance in form of an Ni/YSZ cermet for an SOFC, where Mn has been added, c h a r a c t e r i z e d in that the added amount of Mn represents 0.5 to 10 metal atom%, preferably 2 to 6 metal atom%, especially 4 to 5
15 metal atom%.